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Antimicrobial Activity of Essential Oil Extracted from Matriacira Chamomilla

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Abstract
The essential oil has been extracted from the aerial parts of *matriacira chamomilla* from *Asteracea*e family collected in west of Homs in Syria by hydro-distillation using Clavenger type apparatus. The composition, the qualitative and quantitative analysis of the essential oil was achieved and characterized by means of GC-MS and comparing with the references in the literature. The analysis of the essential oil was permit to identify 17compounds. The major component were Bis-abolol oxide A (2.21%), α-Farnesene (0.18%), Spathulenol (0.15%), Camazulene (1.69%), Ocimene (0.29%)**.** The antimicrobial activity of the essential oil with different concentrations (500µml-1000 µml) against the isolated bacteria extracted from the acne have been studied. The essential oil exhibits primary antimicrobial activity against staphylococcus aureus with (100% of essential oil).
Keywords:Asteraceae,, Matricaria chamomilla, hydrodistillation, Clavenger, essential oil, GC-MS, antimicrobial activity, staphylococcus aureus

1. Introduction

The *Asteraceae* or *compositae* is a very large family, with 1,911 genus distributed over 32913 species [1]. Several genera of *Asteraceae* are very important, such *Matricaria chamomilla*, *Xeranthemum*, *Chrysanthellum*, *Echinacea* in treatment of various disease, and they are a source of antibacterial compounds [2]. *Matricaria* is a wide spread genus of plants of the family *Asteraceae* growing in temperate regions of world, it is very important to obtain its essential oil as herbal tea, and for pharmaceutical or cosmetic properties. The chamomie essential oil is extensively served in food, cosmetics,and pharmaceutical industries It is a popular treatment for numerous ailments, including sleep disorders, anxiety, digestion, intestinal conditions, skin infections and inflammation (including eczema), wound healing, increase of Chamazulene and α-Bisabolol Contents of the Essential Oil of German Chamomile (Matricaria chamomilla L.) Using Salicylic Acid Treatments under Normal and Heat Stress Conditions [3].

The dried flowers are used as herbal infusions, fluid extracts and tinctures in human traditional medicine. It can be combined with other herbal extracts or tinctures for treatment of skin lesions, eczema and inflammations. The flowers traditionally is taken as an anodyne, anti-inflammatory, antiseptic, antispasmodic, and carminative. An infusion is particularly useful as stomachic, nerving and sedative for young children, especially when they are teething. It is rich in volatile terpenoids and sesquiterpene lactones such as matricin, and phenolic compounds, for these reasons it is one of the richest sources of dietary antioxidants, the high percentage of phenolic compounds will be a sources of naturally occurring antioxidants and exhibit some antimicrobial properties [4-5, the volatile composition and the yield depends on the part of plant and season of harvest and the methods of extraction. In this peaper, the antibacterial activity of the essential oil on some bacteria isolated from different areas of pimples with moderate and severe infection from patients with acne have been studied.

2. Taxonomic description of *matriacira chamomilla*

Matricaria chamomilla is a glabrous aromatic annual 10–40 cm, stem simple or branched at base, erect or ascending. Leaves pinnatisect into mucronate segments. Head radiate, 1.5–2 cm in diameter. Ray florets reflexed soon after beginning of flowering. Achene minute about 1 mm. and it is Flowering in April–and May [6].

3. Materials and Methods:

This is a pilot study of qualitative laboratory type, developed in the Laboratory of Microbiology of a albaath college located in Homs city.

3.1 Plant Material

Aerial parts of *Matricaria chamomilla*, were collected and dried in March 2017, from -West of Homs, Syria. The plant was authenticated by the Atomic Agent in Syria. A voucher specimen of plant was deposited in the laboratory of Microbiology, Department of biology, Faculty of sciences, AL Baath University, Homs, Syria.

3.2. Essential oils analysis

The analysis of the essential oil was performed with Shimadzu Bruker Ultra Shield 400MHz gas chromatograph with a capillary column DB5 (30m × 0.25 μm) with an internal character (0.25μm). Temperature program was as follows: 3 min at 40°C, increased to 100°C at a rate of 5°C min, then, increased to 120°C at a rate of 5°C min and held at that temperature for 1 min, increased to 180°C at a rate of 6°C min, increased to 200°C at a rate of 20°C min, increased to 220°C at a rate of 30°C min, then increased to 280°C at a rate of 40°C min and held at that temperature for 1 min. Injection temperature was 230°C. Injection volume was 1.0 μL. Helium was used as a carrier gas (1 mL/min). The identification of the constituents was performed by comparing the spectra obtained with database of Wiley Spectral Library Collection and NSIT library database. Quantitative data were obtained from the electronic integration of the FID peak areas.

3.3. Extraction the essential oil:

The extraction of essential oil was carried out by hydro-distillation using Clavenger type apparatus. 200 gr of *matriacira chamomilla* was boiled in water during 4 hours and the yield of essential oil was 1.77% (w/w). The essential oils obtained has blue color with characteristic odor. The oils were stored in a refrigerator until the analysis by GC-MS

3.4. Procedure Organization

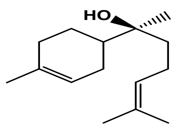
The microorganisms used in the study were selected for representing frequent agents in the occurrence of infections related to healthcare is Staphylococus aureus acquired from the biotechnology Lab.

The chamomilla oil was extracted as follows: the plant was collected in Homs in March 2017. The leaves and seeds were washed with clean water, exposed to dry air and subsequently placed in a Clevenger apparatus for obtaining oil by steam distillation technique, and the hydro distillation method. The extracted Matricaria *chamomilla* essential oil remained in a labeled sterile bottle. The microorganisms were plated by platinum loop into labeled vials containing five milliliters (ml) of sterile nutrient broth and incubated at 36°C for 24 hours. After this period, each microorganism was seeded in two identified and sterile Petri dishes containing nutrient agar. The microorganisms were distributed with sterile swabs by the rolling technique in all the culture medium. Sterile filter paper discs with one centimeter (cm) diameter were soaked in the different concentration of essential oil with the aid of sterile forceps until complete absorption of the products used in the experiment and distributed in the culture media, properly identified and numbered. All plates were placed in a bacteriological incubator at 36°C for 24h. After this time, the reading of the result was carried out with the naked eye and the inhibition zone was measured with a ruler.

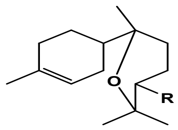
4. Results and Discussion.

4.1. Chemical Composition of essential oil from *Matricaria Chamomilla*:

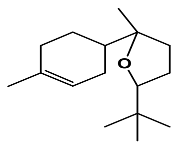
The components of the oils were identified by GC/Mass, The Peaks identification and relative amounts of the various compounds present in the volatile fraction appear in Table 1. A total of 49 compounds were characterized representing 83% of the essential oil. The oil was not dominated by any components, but there are many compounds identified as majority components such: Bis-abolol oxide A (2.21%), O-cimene (0.29%), α-Farnesene (0.18%), Spathulenol (0.15%), Camazulene (1.69%), this results matches with the another studies concerning. *Matricaria chamomilla* in references [7]. The other compounds were presented in low percentages. The analyse of (table 1) shows that most of compounds in present study are identified in the essential oil of other species of *Matricaria chamomilla*, but with difference in proportions. However, another studies reported on the oil of this plant indicated the α-Farnesene or Bis-abolol oxide B as the main compounds. Some differences can occur in composition of oils from the same species probably due to genetic, variation and different environmental factors such climate, harvesting seasons and geographical location [8]. It is important to said that the bis-abolol oxide A (2.21%) occurs as a major compound of ERL (Table 1) followed by α-camazulene (1.96%). The essential oil of *chamomilla* is sometimes preferred by aroma-therapists, because its fragrance is more pleasant than EGL. This oil appears to be useful for treating disorders of skin in pharmaceutical applications, because it is known with a high percentage of bis-abolol oxide B and this content of about 80% for medicinal purpose, [9]. It is possible to classify the essential oil of *Matricaria chamomilla* in four chemotypes in function of the composition of major component *:* chemotypes A is characterized by bis-abolol oxide A as a main component, Chemotypes B is characterized by bis-abolol oxide B as main component, chemotypes C is characterized by α- bis-abolol as main component, chemotypes D is characterized by comparable amounts of α-bis-abolol and bis-abolol oxide A and B), another types is characterized by α-bis-abalone oxide A as main component or the green essential oil with low amount of matricin in essential oil [10]. As the percentage of bis-abalone oxide A is the main component in present study that means the essential oil is from Type A.



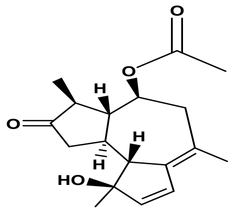
(-)-α-bisabolol



(-)-α-bisabolol oxide A (R= OH)
(-)-α-bisabolone oxide A (R= O)



(-)-α-bisabolol oxide B



Matricine

Table 1. Chemical composition of essential oil extracted of *Matricaria chamomilla*

N°	RT	compound	%	Qual
1	7.28	3,3,6-Trimethyl-1,4-heptadien-6-ol	0.16	72
2	8.93	O-Cimene	0.29	91
3	10.69	3-Aminopyrazole	0.11	72
4	16.46	1-Terpinen-4-ol	0.11	95
5	23.39	Anisole-*p*-propenyl	1.07	98
6	25.45	Caryophyllene	0.18	98
7	26.67	Farnesene	2.46	98
8	29.17	α-Farnesene	0.18	93
10	33.59	(7S)-trans-bicyclo [4.3.0]-3-nonen7-ol	0.35	46
12	34.26	Spathulenol	0.15	90
13	36.61	Epi-bicyclo sesquiphellanderen	0.36	90
14	37.92	α-Bisabolol	0.39	74
15	40.77	Bisabolol oxide A	2.21	93
16	40.88	Brevifolin	0.10	93
17	41.03	2-Pentadecanone,6,10,14-trimethyl	0.43	55
18	41.42	Camazulene	1.69	99
19	43.12	Palmitic acid-methyl ester	0.14	95
20	43.96	Coumarin,7methoxy	0.26	93
21	44.92	1,2-Benzenedicarboxylic acid	0.12	80
22	44.95	Heneicosan	0.08	98
23	46.72	Hexadecane,7,9-dimethyl	0.31	89
24	46.90	1H-Idene,5-buty-6-hexyloctahydr	0.11	91
25	47.27	2,5-Furandione,3-dodecenyl	0.08	92
26	47.58	1,6-Dioxaspiro[4.4]non-3-ene,4-hexadiynylidene	3.50	95
27	48.35	Nonadecane	0.70	95
28	48.89	Cyclohexene	0.27	95
29	50.47	Sclareoloxide	1.23	60
30	50.57	Benzamide	1.40	95
31	50.92	Cembrane	0.31	81
32	51.00	9-Undecen-2-one,6,10-dimethyl	1.64	91
33	50.67	Cyclotetradecane,1,7,11-trimethyl-4-(1-methylethyl)	0.57	70
34	51.28	Nonadecane-9-methyl-	2.13	93
35	52-21	(E) 8-Methyl-9-tetradecen-1-ol	1.14	58
36	52.64	Eicosane	2.77	98
37	53.19	Beta-iso-Methyl ionone	3.35	58
38	54.37	1-Bromo-11-iodundecane	0.30	80
39	53.56	E-8-Methyl-9-tetradecen-1-ol acetate	0.97	70
40	53.65	1,3,1,12-Nonadecatriene-5,14-diol	0.64	58
41	54.24	Cembrane	1.09	83
42	54.64	Eicosane	0.60	86
43	54.81	Hexadecane-2-Methyl	1.33	59
44	55.18	Tetratetacontane	0.89	87
45	55.28	1-Bromo-11-iodoundecane	1.09	46
46	55.66	1-Naphthalenepropanol	1.22	46
47	56.05	Hexadecane,2,6,10,15-tetramethyl	2.31	62
48	56.38	Heptadecane	1.01	89
49	56.75	Heptadecane-2-methyl	2.25	92

To evaluate the activity of the essential oil, it is investigated against the *staphylococcus aureus* .The essential oil exhibit significant activity against the pathogenic bacteria including: *Staphylococcus aureus* in comparing to the gentamicin the results are presented in table 2:

Table 2. The activity of essential oil of Matricaria chamomilla, it is calculated by measuring the diameter of the inhibition zone (mm).

Org.	Essential oil Con.			References	
	100%	50%	25%	gentamicin	DMSO
Staph. aureus	3±0.52	-	-	4.5	-

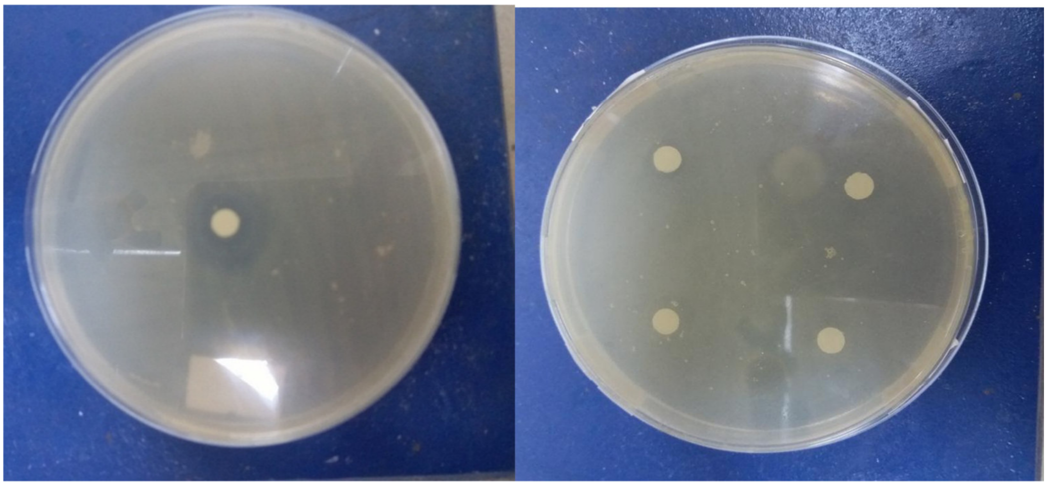


Figure 2: The zones of inhibition by essential oil against to the growing of Staphylococcus aureus of Matricaria chamomilla

4. Conclusion

The Matricaria *chamomilla* from *astearaceae* is a natural source of antimicrobial. The Quantitative and qualitative analysis of the essential oil was identified using GC-MS. 49 compounds, The major components were Bis-abolol oxide A (2.21), Camazulene (1.69%), O-cimene (0.29%), α-Farnesene (0.18%), Spathulenol (0.15%).The percentage of α-bisabolol oxide A is the main component that is means the studied essential oil is from the Type A. The antimicrobial activity of the essential oil with different concentrations (500µml-1000 µml) against the isolated bacteria extracted from the acne have been studied. The essential oil exhibits primary antimicrobial activity against staphylococcus aureus with (100% of essential oil). Therefore, it can be used as the medicinal drug as anti-bacterial and inflammation and it can be also described in the treatment of many diseases.

5. Acknowledgement

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